



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,898	09/22/2006	Hiroyuki Ohno	063057	4742
38834 7590 06/15/2009 WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP 1250 CONNECTICUT AVENUE, NW SUITE 700 WASHINGTON, DC 20036				
EXAMINER				
WHISENANT, ETHAN C				
ART UNIT		PAPER NUMBER		
1634				
MAIL DATE		DELIVERY MODE		
06/15/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/593,898

Applicant(s)

OHNO ET AL.

Examiner

Ethan Whisenant

Art Unit

1634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 February 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

NON-FINAL ACTION

1. In view of the appeal brief filed on 5 Feb 2009, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

The applicant's response (filed 05 FEB 09) to the Office Action has been entered. Following the entry of the claim amendment(s), **Claim(s) 1 and 3-14** as set forth in the appeal brief filed 05 FEB 09 is/are pending. Rejections and/or objections not reiterated from the previous office action are hereby withdrawn. The following rejections and/or objections are either newly applied or reiterated. They constitute the complete set presently being applied to the instant application.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/JD Schultz/

Supervisory Patent Examiner, Art Unit 1635.

35 USC § 112- 2nd Paragraph

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

CLAIM REJECTIONS under 35 USC § 112- 2ND PARAGRAPH

3. **Claim(s) 7** is/are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 is indefinite in that it recites the phrase “for a long term.” As this phrase is a relative term, the metes and bounds of what is intended cannot be determined.

35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that may form the basis for rejections set forth in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

or
(d) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

CLAIM REJECTIONS UNDER 35 USC § 102

5. **Claim(s) 1, 4-6, 11 and 14** is/are rejected under 35 U.S.C. 102(b) as anticipated by Ohno et al. [J. of the Electrochemical Society 148(4) : E168-E170 (2001)].

Claim 1 is drawn to a solvent for dissolving nucleic acids comprising an ionic liquid which can dissolve nucleic acids , said ionic liquid comprising at least one cation selected from a defined group which includes an imidazolium cation and an anion which is selected from a defined group which includes BF_4^- .

As argued previously, Ohno et al. teach a solvent comprising all of the limitations recited in Claim 1. See especially, Column 2 on page E168.

Claim 4 is drawn to an embodiment of Claim 1 or 10 wherein the ionic liquid is a neutralized ionic liquid. .

Ohno et al. teach this limitation. See Column 2 on page E168, wherein Ohno et al. teach "Ethylimidazolium tetrafluoroborate (EtImBF_4) and 1-methylpyrazolium tetrafluoroborate (MePBF_4) were prepared by neutralization of N-ethylimidazole (2.0 g) and N-methylpyrazole (1.0 g), respectfully, with HBF_4 (4.3 or 2.5 g, respectively) in water".

Claim 5 is drawn to an embodiment of Claim 1 or 10 wherein the said solvent is adapted to preserve nucleic acids or to react nucleic acids.

Admittedly, Ohno et al. do not explicitly teach this limitation however, this limitation is, in the examiners opinion, inherent to the EtImBF_4 disclosed by Ohno et al. Note Especially Figure 2. If the ionic liquids of Ohno et al. did not preserve the nucleic acids therein then the conductive films would show essentially the same ionic conductivity as the pure ionic liquids without DNA. See especially Figure 2.

Claim 6 is drawn to a nucleic acid containing solution comprising nucleic acids dissolved in an ionic liquid.

Ohno et al. teach a solution comprising all of the limitations recited in Claim 1.

Claims 11 and 14 drawn to a method(s) of dissolving nucleic acids.

Ohno et al. teach a method of dissolving nucleic acids which comprises all of the limitations recited in Claims 11 and 14, for at least the reason(s) of record. Note especially Column 2 on page E168.

6. Claim(s) 7 is/are rejected under 35 U.S.C. 102(a) as anticipated by Lubiński et al. [US 7,407,755 (2008)].

Claim 7 is drawn to a method for preserving nucleic acids comprising the step preserving nucleic acids in a dissolved state within an ionic liquid for a long term.

Lubiński et al. teach dissolving DNA in TE buffer (i.e. an ionic liquid) and storing said dissolved DNA at 4° C until use (i.e. a long term). See lines 40-50 of Column 10.

RESPONSE TO APPLICANT'S AMENDMENT/ ARGUMENTS

7. Applicant's arguments with respect to the claimed invention have been fully and carefully considered but are not deemed to be persuasive. Claim 1 is drawn to a solvent for dissolving nucleic acids comprising (emphasis added) an ionic liquid which can dissolve nucleic acids said ionic liquid comprising at least one cation selected from a defined group which includes imidazolium cations and at least one anion selected from a defined group which includes BF_4^- . The applicant argues that Ohno et al. does not disclose that the DNA is dissolved in EtImBF_4 . In response the examiner points out that this limitation is not required of the solvent of Claim 1-5 and 10. Claim 1 only requires that the ionic liquid be capable of dissolving nucleic acids. Berthod et al. [Murie Curie Fellows Association Annals (pub. FEB 2004)] on p. 5 teach, "Most ionic liquids readily dissolve biological oligomers, proteins and polymers" thus this limitation is, absent a showing to the contrary, considered to be inherent to the EtImBF_4 of Ohno et al. Furthermore, Berthod et al. teach numerous other ionic liquids which fall within the scope of the "ionic liquids" as recited in Claims 1, 10, 11 and 12. See especially Table 2 on p.3. Finally note lines 40-53 in Column 8 of Nagayama wherein this author teaches using ionic liquids as solvents for nucleic acid molecules.

Regarding the previous issue that related to the meaning of "halide ion" the examiner has now adopted the applicant's definition as set forth on p. 6-7 of the appeal brief which is in accordance with the definition found at About.com:chemistry which teaches the definition of "halide ion" to be "a singlet halogen atom, which is an anion with a charge of -1 (e.g.: F^- , Cl^- , Br^- , I^- and At^-)".

Finally, the examiner points out that the intended use of a composition does not further limit a claimed composition. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In

a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Accordingly, Claim 1 reads on a solvent comprising an ionic liquid which ionic liquid comprises at least one cation selected from a defined group which includes imidazolium cations and at least one anion selected from a defined group which includes BF_4^- . Ohno et al., Berthod et al. and Nagayama all teach such solvents.

35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligations under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103.

CLAIM REJECTIONS UNDER 35 USC § 102/103

10. Claim(s) 7-8 is/are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ohno et al. [J. of the Electrochemical Society 148(4) : E168-E170 (2001)].

Claim 7 is drawn to a method of preserving nucleic acids comprising the step of preserving nucleic acids in a dissolved state within the ionic liquid for a long term.

Ohno et al. teach a method comprising all of the limitations of Claim 7 except Ohno et al. do not explicitly teach that the nucleic acid dissolved in their solvent ionic liquid is preserved. However, this limitation is considered inherent to the ionic liquids formed by Ohno et al. See especially, Column 2 on page E168. Also note the results of Figure 2. If the nucleic acids within the solvent used by Ohno et al. were not preserved during the drying step(i.e. they were degraded) a signal similar to that of the ionic liquid alone would have been seen.

Claim 8 is drawn to an embodiment of the method of preserving nucleic acids as recited in Claim 7 wherein said long term is 48 hours.

Ohno et al. teach this limitation wherein these authors teach drying their DNA films for 4 days (i.e. at least 48 hours).

11. Claim(s) 1, 3, 6, 10-13 is/are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Berthod et al. [Murie Curie Fellows Association Annals (pub. FEB 2004)].

Claim 1 is drawn to a solvent for dissolving nucleic acids comprising an ionic liquid which can dissolve nucleic acids, said ionic liquid comprising at least one cation selected from a defined group which includes an imidazolium cation and an anion which is selected from a defined group which includes BF_4^- and a halide ion

It was well known at the time of the invention (Official Notice) to dissolve nucleic acids in solvents (e.g. TE buffer). Berthod et al. teach numerous different ionic liquids, see Table 2, all of which fall within the broad scope encompassed by the term "ionic liquid" as recited in, for example, Claim 1. In addition, Berthod et al. teach that "most ionic liquids readily dissolve biological oligomers, proteins and polymers". Thus, absent an unexpected result it would have been *prima facie* to the ordinary artisan at the time of the invention to dissolve nucleic acids in an ionic liquid taught by Berthod et al. rather than standard solvents e.g. TE buffer. Please note that substitution of one well known method/reagent with known properties for a second well known method/reagent with well known properties would have been *prima facie* obvious to the ordinary artisan at the time of the invention in the absence of an unexpected result. As regards the motivation to make the substitution recited above, the motivation to combine arises from the expectation that the prior art elements will perform their expected functions to achieve their expected results when combined for their common known purpose. Support for making this obviousness rejection comes from the M.P.E.P. at 2144.07 and 2144.09.

Claim 3 is drawn to an embodiment of Claim 1 or 10 wherein said anion is selected from a defined the group which includes a halide ion.

Berthod et al. teach this limitation. Note that the halide ion (i.e. Cl^-) taught by Berthod et al. in Table 2 on page 3.

Claim 6 is drawn to a nucleic acid containing solution comprising nucleic acids dissolved in an ionic liquid.

Berthod et al. teach this limitation. where these authors teach "most ionic liquids readily dissolve biological oligomers, proteins and polymers".

Claim 10 is drawn to an embodiment of Claim 1 or 10 wherein said anion is selected from a defined the group which includes PF_6^- and a halide ion.

Berthod et al. teach these limitations. Berthod et al. teach these limitations, see at least for example Table 2.

Claims 11-13 drawn to a method(s) of dissolving nucleic acids.

Berthod et al. reasonably suggest a method(s) of dissolving nucleic acids as recited in Claims 11-13. See at least for example Table 2.

CLAIM REJECTIONS UNDER 35 USC § 103

12. Claim(s) 8-9 is/are rejected under 35 U.S.C. 103(a) as obvious over Lubiński et al. [US 7,407,755 (2008)] as applied against Claim 7 above and further in view of Tuffet et al. [US 6,461,571 (2002)] or Burgoyne [US 5,985,327(1999) or Bierke-Nelson et al. [US 5,856,102 (1999)]

Claim 8 is drawn to an embodiment of the method of Claim 7 wherein the term of storage is defined as at least 48 hours. **Claim 9** is drawn to an embodiment of the method of Claim 7 wherein the term of storage is defined as at least 120 hours. Berthod et al. teach these limitations. Berthod et al. teach these limitations, see at least for example Table 2.

As asserted above Lubiński et al. teach a method of storing/preserving DNA in an ionic liquid (i.e. TE buffer) for an undefined period of time (i.e. store at 4°C until use). However, it was well known (Official Notice) to store nucleic acids in buffered solutions for extended periods (i.e. week to month). Furthermore, as evidenced by any of Tuffet al., Burgoyne or Bierke-Nelson et al. it was well known to the ordinary artisan to store nucleic acids for very long periods (i.e. years) as long as special care is taken to avoid the introduction of agents and/or avoid exposure to agents which might destroy the nucleic acid. Therefore, absent an unexpected result it would have been *prima facie* obvious to one of ordinary skill at the time of the invention to store and preserve a nucleic acid sample for a long term (i.e. at least 120 hours) in the ionic liquid taught by Lubiński et al. The ordinary artisan would have been motivated to make the modification recited above in order to store unused portions of a nucleic sample for future use.

13. Claim(s) 7-9 is/are rejected under 35 U.S.C. 103(a) as obvious over Lubiński et al. [US 7,407,755 (2008)] as applied against Claim 7 above and further in view of Berthod et al. [Murie Curie Fellows Association Annals (pub. FEB 2004)] and Tuffet et al. [US 6,461,571 (2002)] or Burgoyne [US 5,985,327(1999) or Bierke-Nelson et al. [US 5,856,102 (1999)].

Claim 7 is drawn to a method for preserving nucleic acids comprising the step preserving nucleic acids in a dissolved state within an ionic liquid for a long term.

Lubiński et al. teach dissolving DNA in TE buffer (i.e. an ionic liquid) and storing said dissolved DNA at 4° C until use (i.e. a long term). See lines 40-50 of Column 10. Lubiński et al. does not teach the ionic liquids as defined in Claim 1, for example. However, Berthod et al. do teach ionic liquids as defined in Claim 1. In addition, Berthod et al. teach that "most ionic liquids readily dissolve biological oligomers, proteins and polymers". Thus, absent an unexpected result it would have been *prima facie* to the ordinary artisan at the time of the invention to dissolve nucleic acids in an ionic liquid taught by Berthod et al. rather than standard solvents e.g. TE buffer as taught by Lubiński et al. . Please note that substitution of one well known method/reagent with known properties for a second well known method/reagent with well known properties would have been *prima facie* obvious to the ordinary artisan at the time of the invention in the absence of an unexpected result. As regards the motivation to make the substitution recited above, the motivation to combine arises from the expectation that the prior art elements will perform their expected functions to achieve their expected results when combined for their common known purpose. Support for making this obviousness rejection comes from the M.P.E.P. at 2144.07 and 2144.09. Furthermore, it would have been *prima facie* to the ordinary artisan at the time of the invention to store the dissolve nucleic acids until the artisan was prepared to utilize the stored nucleic acids.

Claim 8 is drawn to an embodiment of the method of Claim 7 wherein the term of storage is defined as at least 48 hours. **Claim 9** is drawn to an embodiment of the method of Claim 7 wherein the term of storage is defined as at least 120 hours.

As argued above Lubiński et al. in view of Berthod et al. reasonably suggest a method of storing/preserving DNA in an ionic liquid for some period of time. However, it was well known (Official Notice) to store nucleic acids in solutions for extended periods (i.e. week to month). Furthermore, as evidenced by any of Tuffet al., Burgoyne or Bierke-Nelson et al. it was well known to the ordinary artisan to store nucleic acids for very long periods (i.e. years) as long as special care is taken to avoid the introduction of agents liquid and/or to avoid exposure to condition which might destroy/degrade the dissolved nucleic acid. Therefore, absent an unexpected result it would have been *prima facie* obvious to one of ordinary skill at the time of the invention to store and preserve a nucleic acid sample for a long term (i.e. at least 120 hours) in the ionic liquid reasonably suggested by the combination of Lubiński et al. in view of Berthod et al. The ordinary artisan would have been motivated to make the modification recited above in order to store unused portions of a nucleic sample for future use.

REFERENCES CITED

14. The examiner requests that a copy of the **Robinson et al.** abstract cited on the 1449 filed 10/29/2008. It is not present in the record.

CONCLUSION

15. **Claim(s) 1 and 3-14** is/are rejected and/or objected to for the reason(s) set forth above.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ethan Whisenant, Ph.D. whose telephone number is (571) 272-0754. The examiner can normally be reached Monday-Friday from 8:30AM - 5:30PM EST or any time via voice mail. If repeated attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James (Doug) Schultz, can be reached at (571) 272-0763.

The Central Fax number for the USPTO is (571) 273-8300. Please note that the faxing of papers must conform with the Notice to Comply published in the Official Gazette, 1096 OG 30 (November 15, 1989).

/Ethan Whisenant/
Primary Examiner
Art Unit 1634